in the effective temperature–luminosity diagram can be outlined and the period–luminosity relation determined.

It is found that the ionization zone of hydrogen and both ionization zones of helium all contribute to the instability. The mean effective temperature at which maximum instability occurs depends only very weakly on mass and mean luminosity. The instability region is thus an almost vertical strip in the temperature–luminosity diagram. The width of this strip is in good agreement with the width of the observed Cepheid band, but the mean effective temperature at the center of the strip is several hundred degrees lower than that determined from observations (Kraft, R. P., *Astrophys. J.* **134**, 616, 1961). This conclusion appears to be nearly independent of the assumed mass–luminosity law and of the assumed chemical composition. The calculated periods are rather larger than the observed ones, but depend upon the adopted masses. The slope of the period–luminosity relation, $M_v = A - B \log P$, is somewhat larger ($\sim 30\%$) than the observed slope, but this result also depends upon the mass–luminosity law. The period–luminosity relation also depends upon the assumed composition. Detailed results are presented and compared with the observations.

Dense Stars and Problems of Their Detection.

H. Y. CHIU, *Institute for Space Studies, New York*.—Stars with a density approaching nuclear density ($\sim 10^{14}$ g/cm³) are formed during the supernova explosion of a star. Such stars are of great interest. Since the gravitational energy of such stars is of the same order as their rest energy, general relativistic effects will become very important.

In this paper we discuss the formation of such stars, their observable features and their detection. In particular, we shall discuss the value of an orbital astronomical observatory in detecting such stars.

Existence of Symmetric Periodic Orbits in the Restricted Problem of Three Bodies in Three-Dimensional Coordinate System. RAM KISHORE CHOUDHRY, *L. S. College, Muzaffarpur, Bihar, India*.—In this paper $z=0$ has been taken for the intermediate plane. Then, having established the conditions for symmetric periodic orbits, the existence of analytical continuation and its parametric representation in cylindrical coordinates for the circular orbits in the direct and retrograde motion for the two-body problem with respect to the moving axes is proved and these curves are seen to be positively tangential to the orbits in the actual problem. The points of contact of the orbits and the

analytical continuation define a transformation which helps to prove the existence of symmetric periodic orbits of Schwarzschild's type in the three-dimensional restricted problem of three bodies. The above results hold good for the minor planets with the commensurability 3/1, 5/1, 7/1, etc.

A Dynamical Model of SU Draconis. R. F. CHRISTY, *California Institute of Technology*.—The numerical solution of the coupled equations of motion and heat flow in the envelopes of pulsating stars (Christy, R. F., *Astron. J.* **68**, 275, 1963) is being continued with the same technique and boundary conditions. A survey of the pulsation of RR Lyrae models, all with period of $\frac{2}{3}$ day, has been made, aimed at determining the mass, radius, temperature, and composition of SU Draconis. The best fit to the observations of Oke, Giver, and Searle (*Astrophys. J.* **136**, 393, 1962) is obtained with nearly the same parameters that they report. We find $P(\rho/\rho_\odot)^{\frac{1}{2}} = 0.035$. The mass appears to lie between 0.6 and 1.2 $M_\odot$ and the best value for the mean radius is 4.7×10^6 km, corresponding to a mass of 0.9 $M_\odot$. The hydrogen–helium ratio is closely correlated with the mean temperature and the best value is about 45% He by mass with the mean $T_e = 6500^\circ$. This corresponds to a minimum temperature of 6000° and gives a mean absolute bolometric magnitude of $+0.1$. The models in the range 30% He to 70% He are not unreasonable but require mean temperatures ranging from 6200° at 30% He to 6800° at 70% He.

The quantities which appear useful in matching a computed model to the observations, in addition to the period, are the shape of the velocity curve, the magnitude of the radius variation (from the Wesselink method), the area between the luminosity curve and the mean luminosity, and the phase difference of the luminosity and velocity curves. In particular, the information from the velocity curve is important in selecting a radius and a He abundance. Correlations between the above quantities are presented.

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On the Probable Meteorite Origin of the Clearwater Lakes, Quebec. M. R. DENCE, M. J. S. INNES, AND C. S. BEALS, *Dominion Observatory, Ottawa*.—An origin by impact of twin meteorites is suggested for two circular basins 32 and 20 km in diameter forming the Clearwater Lakes (lat. $56^\circ N$, long. $74^\circ 30' W$). The following evidence supports this theory: